

# PATENT COOPERATION TREATY

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From the  
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

## WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing  
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference  
see form PCT/ISA/220

**FOR FURTHER ACTION**  
See paragraph 2 below

International application No.  
PCT/JP2005/006546

International filing date (day/month/year)  
28.03.2005

Priority date (day/month/year)  
01.04.2004

International Patent Classification (IPC) or both national classification and IPC  
H01M8/04, H01M8/00

Applicant  
YAMAHA HATSUDOKI KABUSHIKI KAISHA

**1. This opinion contains indications relating to the following items:**

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

**2. FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

**3. For further details, see notes to Form PCT/ISA/220.**

Name and mailing address of the ISA:



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**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/JP2005/006546

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**Box No. I Basis of the opinion**

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1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
  - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material:
    - ☐ a sequence listing
    - ☐ table(s) related to the sequence listing
  - b. format of material:
    - ☐ in written format
    - ☐ in computer readable form
  - c. time of filing/furnishing:
    - ☐ contained in the international application as filed.
    - ☐ filed together with the international application in computer readable form.
    - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/JP2005/006546

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**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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**1. Statement**

|                               |             |      |
|-------------------------------|-------------|------|
| Novelty (N)                   | Yes: Claims | 1-22 |
|                               | No: Claims  |      |
| Inventive step (IS)           | Yes: Claims |      |
|                               | No: Claims  | 1-22 |
| Industrial applicability (IA) | Yes: Claims | 1-22 |
|                               | No: Claims  |      |

**2. Citations and explanations**

**see separate sheet**

SECTION V -----

**1. Prior art**

Documents (1) - (6) cited in the **International Search Report**, are considered to represent relevant prior art; the numbering will be adhered to in the rest of the procedure.

- (1) EP-A-1 401 041
- (2) WO-2004/006369
- (3) WO-A-01/52 339
- (4) JP-A-2000/021430
- (5) JP-A-8,091,804
- (6) JP-A-2002/090009

**2. Novelty and unity**

2.1 The present set of 27 claims refers to a fuel cell system and a transport equipment comprising it ( claims 1 - 16 ) and a control method for a fuel cell system ( claims 17 -27 ). It is noted that in the present form the technical feature of the fuel cell system and those of the control method are not identical. With regard to the analysis as performed above it is stressed that in the present form of the claims **different novel technical elements** render each of the respective claimed subject-matter **novel over the respective prior art**. The Applicant's attention is drawn to the fact that in order to be unitary ( **Rule 13 PCT** ) a **special common technical feature** in the sense of **single inventive concept** within the meaning of **Rule 13 PCT** has to be present for the provision of all the inventions. Moreover, 2 different technical problems can be formulated for the 2 inventions of claims 1 - 16 and 17 - 27. The application in its present version thus does not meet the requirements of **unity** of invention. The Applicant is invited to file a new set of claims and to comment on the presence of a common technical feature in order to demonstrate that the complete claimed subject-matter is **unitary**.

2.2 Citations (1) - (3) all refer to the problem of *antifreezing for fuel cell systems*. Though all cited documents refer to fuel cells which *generate electric energy* by electro-chemical reactions, none of the documents discloses a fuel cell system with a first tank which holds fluids discharged from the fuel cell, a second tank arranged to receive fluid that is stored in the first tank, a first drive device arranged to move the fluid in the first tank to the second tank and a controller arranged to control operation of the first drive device at a time of non-

power generation. From document (1) a fuel cell system is known comprising a first ( fuel line water recovery tank ) and a second ( air line water recovery, second water recovery ) tank and a Controller controlling the water discharge valve. No device for moving the fluid is mentioned. The Controller disclosed in citation (2) performs an ordinary/cold start up control routine/freeze prevention routine ( see figs. 7 - 10 ). The controller / sensor in the fuel cell system of citation (3) monitors the temperature and if necessary increase the fuel concentration of the anode. From the document (4) a fuel cell system is known in which water is moved to the aqueous solu-tion tank when the system ceases operation and a switching valve is opened to dis-charge water from the water tank and from water channels. Citations (5) and (6) dis-close fuel cell system with similar defrosting devices. The requirements of **Article 33 (2) PCT** appear thus to be met.

### **3. Inventive step**

For the assessment of **inventive step ( Article 33 (3) PCT )** ( possible only for unitary subject-matter, see above ) starting from the document of the closest prior art the **technical problem ( Rule 5.1 (a) (iii) PCT )** underlying the application in suit has to be de-fined objectively. Starting from the state of the art (4) this problem can be considered to be the provision of a further/alternative *fuel cell system* which collects fluid discharged from the fuel cell and a control method therefor. The solution of this problem is the pro-vision of the fuel cell system according to claim 1 including a controller.

3.1 From the cited prior art (1) - (6) fuel cell systems and control methods dealing with the problem of antifreezing mechanisms are known. The skilled person starting from the *fuel cell system* e.g. disclosed in (4) enabling the secure starting of the system without having water left in the system and wishing to solve the above defined problem, with a **reasonable expectation of success** would expect the claimed *fuel cell system* to be suitable for his purpose. Due to the teaching and the operating methods disclosed in the cited prior art he would consider the simple construction of the claimed *fuel cell system* as a clear **incentive** in order to solve the above defined problem e.g. to intro-duce a controlling unit in order to avoid the water discharge indoors. The skilled person would have been able to **predict** that the fuel cell system of present claim 1 would be applicable to solve the above defined technical problem. Accordingly, the solution of the above defined problem i.e. the provision of a further/alternative fuel cell system which collects fluid discharged from the fuel cell and a control method therefor does not in-volve **inventive step** in the sense of **Article 33 (3) PCT**.

3.2 Given the properties to be expected for the claimed fuel cell system, in comparison with those of the cited prior art, an **inventive step** could be recognized if the Applicant could demonstrate that the presently claimed fuel cell system would illustrate any unpredictable ( qualitatively or quantitatively ) effects. As far as the **closest prior art** is concerned it is noted that the modifying feature should not only characterize the invention in the claim i.e. distinguish it from the prior art, but must contribute causally to the improvement of the capability thereby achieved. In the present case the claimed fuel cell system has to be compared with those of the respective closest prior art which only differ by the novelty rendering feature all the other features have to be the same. Lacking such data at present the requirements of **Article 33 (3) PCT** are not met.

3.3 Finally, it is stressed that the Applicant is entitled to claim all obvious modifications of what he has described and that alternative variations have to be supported by a certain number of examples. Furthermore, the extent of a "reasonable generalisation" only depends upon the question of the relative distance to the prior art. It is stressed that only such fuel cell systems can be claimed which are a solution to the above stated problem i.e. which illustrate the alleged unexpected effects. If necessary the claims have to be restricted to such methods.

3.4 Any information the Applicant may wish to submit concerning the subject-matter of the invention, for example further details of its advantages or of the problem it solves, and for which there is no basis in the application as filed, should be confined to the letter of reply and not be incorporated into the application ( **Articles 34 (2) (b)** and **19 (2) PCT** ).

3.5 Any newly filed claims are considered to have to satisfy the criteria set forth in **Article 33 (1) PCT**. In such a case the applicant will have to bring the description into conformity with these claims; care should be taken during revision, especially of the introductory portion including any statement of problem or advantage, not to add subject-matter which extends beyond the content of the application as originally filed ( **Article 34 (2) (b) PCT** ).

3.6 The Applicant is requested to file amendments by way of replacement pages in the manner stipulated by **Rule 66.8 (a) PCT**. In particular, fair copies of the amendments should be filed preferably in triplicate. Moreover, the applicant's attention is drawn to the fact that, as a consequence of **Rule 66.8 (a) PCT** the examiner is not permitted to carry out any amendments under the PCT procedure, however minor these may be.

#### 4. Industrial applicability

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AUTHORITY (SEPARATE SHEET)**

International application No.

**PCT/JP2005/006546**

No objection re industrial applicability of claims 1 - 27 arises insofar as unitary subject-matter e.g. the fuel cell system would exhibit the alleged unexpected effects ( **Article 33 (4) PCT** ).

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